

CS-CASH

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CS-CASH Annual Report

Central States Center for Agricultural Safety and Health

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University of Nebraska Medical Center, College of Public Health

Section I

Center Summary

The Central States Center for Agricultural Safety and Health (CS-CASH) was funded as one of nine NIOSH agricultural health and safety centers, starting September 2011. CS-CASH is based out of the University of Nebraska Medical Center, College of Public Health in Omaha, Nebraska. The Center serves seven states in the central United States: North Dakota, South Dakota, Nebraska, Kansas, Minnesota, Iowa, and Missouri. CS-CASH is a partnership where public health, agricultural, and grass roots organizations contribute to a common goal: reducing injury and illness in agriculture by utilizing their strengths and regional presence. We envision a vibrant agricultural sector in our region and the United States where health and safety is highly valued and work-related injuries and illnesses are rare. Our mission is to work with the agricultural community in the Central States and beyond, conducting research, intervention, education, and outreach activities, with the aim of discovering the mechanisms of injury and illness, and developing, implementing, and evaluating prevention strategies that measurably improve the health and safety of members of the agricultural community.

Relevance

CS-CASH aims to improve the safety and health of farmers, ranchers, agricultural workers, and their families. The Center conducts research and translates findings into practical applications. Research teams from different states and institutions bring expertise and access to farm audiences in the Center's region. With strong public health – agriculture – grassroots partnerships we can address local, regional and national issues. The Center research projects focus on injury prevention and surveillance, respiratory disorders, hearing loss, education, vulnerable workers, mental health and sleep deprivation. Information is disseminated through events, agricultural shows, school programs, courses, presentations, articles, and messages in electronic and printed media.

Key Personnel

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Face to face interviews, mailed surveys and focus groups were used to identify differences and similarities between 5 demographic farmer groups for perceived hazard exposure, prevention tactics, communication channels and educational resource preference.

“Extension is an obvious place to address farm safety. Every farmer, whether you are organic or conventional, knows their local county Extension agent.”

54 year old organic farmer focus group participant.

Safety and Health Education for Non-Traditional Farm Families **Shari Burgus PI**

Changing farm demographics influence hazard exposure, prevention tactics, communication channel choices, and resource preferences. This project seeks information from traditional, retired, residential/lifestyle, and organic farmers to identify the differences and similarities in information needs. In the first year of the project three data collection methods were used to collect data in the CS-CASH 7-state region: National Agricultural Statistics Service administered a survey to 1,038 farmers; Face to face interviews were completed with 511 farm family members; and Five focus groups were conducted.

In the second year of the project data collected from each method were compiled and compared to identify the differences and similarities among the various farm groups. Mailed survey respondents identified a total of 38 farm hazards including machine/equipment. While 27% of organic farmers required safety information for one or more hazards only 7% of retired and residential farmers required this information. The top perceived hazards and need for safety information were power take off hazards, lawn mowers, tractors, machine shops, storage structures, confined spaces, animal handling, pesticide exposure, lifting heavy objects, hearing loss, musculoskeletal problems, respiratory disorders, and stress. Farm size and operator demographics were significant predictors of hazards perception and safety information needs among farmers in Central States region. Face to face interviews revealed that most respondents preferred information on chronic exposures; receiving training through certification programs; interest in health screenings including hearing tests; receiving safety information through farm papers, short fact sheets and from attending farm shows; the most trusted source of safety and health information was the Extension Service. Statistical differences were found between differing demographic groups. Focus groups revealed that residential/lifestyle farmers were most likely to talk about their family members when discussing safety and health issues. Organic farmers were the only farm group to discuss ergonomic issues. Although personal protective equipment (PPE) was mentioned very little by all farmer groups, organic farmers mentioned it the most.

In the 3rd, 4th years of the project, topics and existing educational resources identified in the data collection process will be pilot tested, new relevant resources will be developed for each farmer group, and adapted upon results. In the 5th year pilot tested information will be disseminated.

ADMA: A Novel Pathway in Organic Dust-mediated Allergic and Non-allergic Asthma **Todd Wyatt PI**



Microscopic cross section of the ciliated cells lining the airways of the lung. These cells are the first line of defense protecting the lungs from inhaled dusts.

Modern industrialized farming practices have led to working conditions that include high levels of airborne dust. Agricultural workers inhale these complex organic dusts daily, leading to airway inflammation and a higher risk for developing chronic obstructive pulmonary disease. The mechanisms regulating the organic dust-induced airway inflammatory response in the lung are not well defined. Our overall hypothesis is that airway epithelial cell innate defense is governed by a bi-directional kinase regulatory mechanism whereby agents that activate protein kinase C (PKC) are pro-inflammatory and agents that activate protein kinase A (PKA) are anti-inflammatory.

We established that airway epithelial PKA activation requires the functional production of nitric oxide. Furthermore, we found that enhancing the nitric oxide pathway by over-expressing a nitric oxide protective enzyme (DDAH) was protective against swine barn dust-stimulated PKC activity and inflammation in a mouse model. To further investigate the mechanisms of this pathway, we have recently found the following:

- Agents that enhance nitric oxide production decrease swine barn dust induced lung inflammation
- DDAH overexpression blocks endogenous nitric oxide synthesis inhibitors and is protective against swine barn dust-induced lung inflammation
- PKA activation results in the attenuation of tumor necrosis factor (TNF) converting enzyme activity, leading to the inhibition of swine barn dust-induced TNF alpha production in airway epithelium

Surveillance of Agricultural Injuries in the Central States Region Risto Rautiainen PI

The objective of this project is to improve the surveillance of injuries in agriculture by developing an innovative, cost-effective surveillance system using a combination of existing data sources. CS-CASH collaborates with the National Agricultural Statistics Service (NASS) to accomplish two specific aims: 1) to implement an annual injury survey, linked with existing data from the Census of Agriculture, and 2) to describe injuries, injured persons, rates of injury, and risk factors for injury.

The second round of data collection was conducted in the spring of 2013; 2391 out of 7000 farms responded (35% response rate). These farms had 3335 operators. The majority of the operators were male (84%), and the majority spent more than 50% of their time working on a farm or ranch (52%). The incidence of injuries among operators was 8.4% (202 injuries in 2012) compared to 6.1% in 2011. The average direct cost of injury out-of-pocket was \$3495 in 2012 compared to \$1712 in 2011. Insurance paid an average of \$7085 in 2011 compared to \$7723 in 2011. Nearly 56% (140) of injuries required professional medical care, 9% (18) resulted in hospitalization, and 99 injured operators lost work time ranging from less than half a day to 30 days or more. Frequently the injuries were sustained as a result of interaction with livestock (20%) in a field/pasture or farm yard.

The injury surveillance also involves tracking injury cases through a press clipping service. In 2013, this system found 86 fatal (92 in 2012) and 92 non-fatal (102 in 2012) agricultural injury cases in the Center's seven-state region. Individual case information from the media can be helpful in understanding the circumstances resulting in injuries. Together these data sources provide valuable information for prevention of injuries in the region.

Outreach Program Debra Romberger Program Director

The goal of the Outreach program is to integrate information from Center research and external sources and translate it into outreach efforts with the ultimate outcome being a reduction in hazards and an improvement in worker health and safety. This is accomplished by the use of internet resources, electronic communication, dissemination of information through the media as well as at farm shows and community events. The CS-CASH Outreach focus in year 2 was on hearing protection including extensive outreach to young farmers and a crowd sourcing video contest for FFA students on the topic of "Hearing Loss from Agricultural Noise is Preventable". All students who participated in the production of the video received ear muffs, ear plugs, a PPE storage bag and educational materials. Producing the 60 second videos provided opportunities for students and advisors in FFA chapters to learn about hearing loss and prevention methods, provided important information to the "voting" public and an opportunity for the students and public to explore the CS-CASH website. The videos were posted on YouTube so they have become an enduring teaching tool. The FFA videos have received over 2200 votes. To view the winning videos visit: <http://www.unmc.edu/publichealth/cscash/news.htm>

Four hearing and respiratory protection email blasts were deployed in year 2 to the over 1750 CS-CASH Community Contact Network members comprised of public health, extension, agribusiness, producer and grass-roots organizations and individuals with an interest in promoting agricultural health and safety, as well as to over 14,000 farmers and ranchers in the Center's seven states region and to over 100 rural newspapers. CS-CASH members handed out educational materials, presented PPE demonstrations and gave presentations in 47 locations in the CS-CASH 7 states region. A hearing protection demonstration at the SciFest Fair in Omaha NE reached over 2500 students. A hearing protection video is currently being professionally produced that will be posted on YouTube and the CS-CASH website and will be sent out as a link in educational emails. CS-CASH collaborated with the other 9 Agricultural Safety and Health Centers to produce the US Agricultural Safety and Health Centers YouTube site. This site houses peer reviewed videos from many of the Centers, including 4 respiratory protection videos produced by CS-CASH. To date the site has 94 subscribers and over 3400 views. To view the site: <http://www.youtube.com/user/USAgCenters>.



Livestock accounted for 20% of all injuries sustained by farmers and ranchers in the Central States region in 2012.



Survey results in the 7 state region found ATVs and tractors accounted for 29 injuries while press clippings from 2012 reported 67 nonfatal injuries and 66 fatalities from these equipment in the same time



Hearing protection educational outreach was targeted to young farmers and future farmers.



Using a hearing mannequin along with demonstrations of correct usage for masks, ear plugs and ear muffs helped deliver effective safety and health messages to farm families, FFA and 4H groups.



Noise levels were measured on each of the 22 control and intervention farms.



Hearing protections devices were placed in weather-proof boxes near all sources of noise on intervention farms.



NASD www.nasdonline.org is the most widely recognized and used Internet based assemblage of educational resources related to human health and safety in production



Many of the resources on the NASD website are available in Spanish. Additional multilingual resources are currently being solicited.

Preventing Hearing Loss Among Farmers by Point-Source Hearing Protection Strategy Chandran Achutan PI

The long-term goal of this four year study is to reduce occupational hearing loss among workers in the agricultural sector. The central hypothesis is that, relative to a control group, intervention farmers will experience less noise-induced hearing loss, and their hearing protection device use will increase significantly when these devices are placed near point sources of noise, including tractors, combines, mowers, loaders, augers, grain dryers, and certain power tools. The intervention is highly participatory, in that the research team works with the farm family, identifying high noise exposure tasks and sources and seeking solutions to each noise exposure.

During year 2 of the study 22 farms were recruited, of which 12 are in the intervention group and 10 are in the control group. Study participants had the study explained to them, and after obtaining their written consent, they received a hearing test; filled out a medical history and a questionnaire related to their beliefs and opinions about wearing hearing protectors. Recruitment efforts to locate 38 more farms have been expanded by placing flyers in places frequented by farmers, as well as sending letters. Full-day noise levels were recorded at each farm. At the intervention farms, weather proof boxes were installed that holds ear muffs and earplugs in all areas where farmers are exposed to loud noise. The boxes were designed and developed by researchers with input from a local company. Farmers have expressed satisfaction with the ease of accessibility for hearing protection devices. Hearing tests identified pre-existing hearing loss in intervention and control group participants. Responses to the questionnaire demonstrated a lack of knowledge regarding hazards related to noise exposures.

National Ag Safety Database Charles Schwab PI

The National Ag Safety Database (NASD) is the most widely recognized and used Internet based assemblage of educational resources related to human health and safety in production agriculture. Originally created in 1993 as a CD-ROM resource with support from NIOSH, NASD has changed to accommodate both the moving demands of its audiences and the advancements of the Internet. The goal of this project is to make audience targeted educational resources from NIOSH centers, researchers, educators, and standards accessible to end users in the agriculture, forestry, fishing, and hunting industry. To accomplish our goal, researchers identify, solicit and add new safety and health print materials; review materials on an ongoing basis for accuracy and usefulness; identify, solicit and add more on-line safety and health non-print materials; develop new original on-line training units for the NASD website; solicit and develop more multilingual resources and promote NASD and NIOSH safety and health efforts. Work on these goals will continue in years 3, 4 and 5.

Conceptual Arts, Inc. has recorded the site analytics for the NASD from September 2012 through August 2013. An average of 25,052 site visits per month with an average of 38,393 page views per month were recorded. Well over half of the visits come from the United States, and a majority of the visits come from English speaking countries. Three quarters of the visits were from desktop/laptop computers leaving one quarter of the visits from mobile devices/tablets. The most access document was related to preventing stress, and two of the top 10 accessed documents were written in Spanish. Thirty-two new documents were added to the site in this time period. Evaluating NASD is critical to maintain vitality and creditability. A user survey has been constructed and will be deployed in the coming year. Users opt in by clicking on a link on the NASD home page and answering a few questions.

There are several opportunities provided on the NASD Web site for users to ask questions, report problems, or recommend materials. Most of these messages are questions about safety or health issues, and they all receive a response back in a timely manner.

Education/Translation Core

Susanna Von Essen Director

Experiential learning continued to be used as a teaching tool during the second year of the Education/Translation Core. Elements of agricultural health and safety were incorporated into various medical (MD and PA), nursing and public health school curricula used on the UNMC campus.

All UNMC medical students receive a lecture on farm health and safety as part of the Integrated Clinical Experiences curriculum. A similar lecture is given to the physician assistant students. A week long Agricultural Medicine Course was attended by 19 health care professionals from across the US. Continuing education credit and academic credit was available to physicians, nurses and veterinarians who attended this course. A class session is devoted to farm health and safety as part of the Advanced Occupational Health Course for UNMC MPH/PhD students. Students in all disciplines volunteer at various farm shows in the region conducting lung function tests and demonstrating correct use of PPE. Outreach at agricultural events gives farmers an opportunity to interact with medical professionals, to receive health screening and to receive educational information. UNMC nursing students enrolled in the Population Centered Care Projects course presented agricultural respiratory and hearing protection information to classes of FFA students in Iowa. The nursing students prepared PowerPoints, games, and demonstrations to help educate the FFA students about the importance of wearing hearing and respiratory protection while working on the farm. Pre and post intervention surveys was given to the students that will evaluate the effectiveness of the training.

In summary, this educational program impacted many students on UNMC's campus and throughout the US, including medical, physician assistant, nursing and MPH students. A wide range of farm health and safety topics were covered. It is a robust program that is ready for dissemination to other medical schools and colleges of public health.

Evaluation Program

Mary Cramer PI

We evaluated the Center's organizational effectiveness with the Internal Coalition Effectiveness (ICE©) survey and field visits. ICE© findings revealed that Center strengths continue to be: a) strong sense of shared social vision and mission among members and b) highly collaborative relations among project leaders and members to promote Center goal achievement. Compared to last year, the Center showed an increase in knowledge gained among Center participants regarding ag safety and health issues. Field visits in April and August, 2013 to new pilot project investigators showed that pilot project investigators valued the Center's research resources/support in helping them achieve external grant funding. Suggestions to strengthen Center organizational effectiveness included having regular budget updates and continued opportunities to collaborate. Final reports for the ICE© evaluation and field visit evaluation were submitted and discussed with Center leadership.

To establish long-term outcomes and impacts of the Center projects, we collected baseline data for knowledge, attitudes, and practices in the Center's three priority areas: hearing, injury and respiratory health. We worked with Center leaders to develop a 30-item instrument, Midwestern Farm Operators Respiratory and Hearing Health Survey that was mailed to 1,000 ag operators in the 7-state region served by the Center. Response rate was 28% (n= 280). Findings showed important knowledge and attitude gaps for dust exposure, noise exposure, and protective equipment selection/use and differences were apparent by age groups. The Final Report was shared with Center leaders and members, and findings were used to develop the hearing protection campaign and community outreach.

The Evaluation Team was actively involved this year with other ag center evaluators from across the country. Our goal was to identify common measures for reporting economic impact and cost benefits of ag health and safety programs. To this end, Dr. Fernando Wilson, health economist, has been added to the Center's Evaluation Team. Dr. Wilson will be consulting on the development of data collection strategies and measures for assessing cost benefits of the Center's programs in the 7-state region.

The Evaluation Core tracked Center projects using our on-line Access database. We met with Center leadership on an "as needed" basis to review projects status.



UNMC College of Nursing students prepared presentations and demonstrations on hearing and respiratory protection for FFA Students in Iowa High Schools. The materials produced will endure as online training modules.

"I didn't know that being around some farm chemicals can cause hearing loss, that's important stuff."

Response from FFA student on post-education survey



An emerging issues pilot project examines the risk posed by inhaling agricultural dust to individuals who are sensitized to fungus.

Pilot and Emerging Issues Projects **Eleanor Rogan Program Director**

One essential program within CS-CASH is the Pilot/Feasibility Projects and Emerging Issues Program, which supports pilot and feasibility projects, with the goal of enabling investigators to collect preliminary data to support submission of grant applications for independent, longer-term, larger projects related to agricultural safety and health. The central hypothesis of this program is that pilot and/or feasibility projects funded from this Center will result in subsequent grant submissions to NIOSH or other funding agencies to advance agricultural health and safety research. The projects selected for support by this program must address a critical issue in agricultural safety and health and clearly lead to future, more extensive study of the selected critical issue.

Announcements of the availability of funding for pilot/feasibility projects were sent out in May 2012. Ten proposals were submitted and reviewed by appropriate members of the CS-CASH Internal Advisory Committee. Three projects were funded. As a result of a \$40,000 award from the UNMC Vice Chancellor of Research CS-CASH was able to fund four additional pilot projects for a total of 7 FY02 Pilot Program Projects. A review of the 5 funded FY01 projects and the 7 funded FY02 funded pilot projects follows.



During planting and harvest seasons many farmers may experience sleep deprivation as they work late into the night .

Effects of Sleep Deprivation on Balance, Stress and Recovery among Farmers **Ka-Chun (Joseph) Siu PI**

The goals of this project are to determine how sleep deprivation affects balance in farmers and influences stress and recovery based on heart rate variability. These goals will be accomplished by studying the performance among farmers longitudinally in repeated one-week observation periods before, during and after the busy spring planting and fall harvest seasons. Balance performance, sleep patterns and daily activity levels were collected from five farmers during and after the fall harvest as well as spring planting seasons. Data collection for a sixth farmer is ongoing. The preliminary results suggest that reduced sleep impacts balance stability. As the number of sleeping hours decreased, balance became unstable surprisingly, when farmers stand with eyes open. It is possible that sensory integration in the body is compromised when farmers lack sleep. More data are collected to confirm this important finding. Ultimately, we aim to provide the scientific basis for new guidelines recommending how farmers should self-regulate their sleep and working hours, particularly during busy planting and harvest seasons.



Health screenings combined with a farm safety assessment provide a comprehensive health and wellness plan for farmers and ranchers that can be sustained financially by reduced insurance premiums and client fees.

AgHealth Nebraska: a novel preventive health services model for Nebraska Farm Families **Matthew Beacom PI**

Agriculture is a vitally important part of Nebraska's economy, yet farmers experience high rates of injury and illness and poor access to medical care. The AgHealth Nebraska model addresses the medical and farm safety education needs of farm families. The AgriSafe Network, Certified Safe Farm, and wellness concepts have been incorporated into modern rural clinical practice. It is the aim of the AgHealth model to detect serious health conditions at an early stage, identify and remove injury and illness hazards, set personal wellness goals, and provide incentives for farmers to manage their health and wellness. AgHealth is designed to be sustainable with client fees, insurance reimbursements and agribusiness support. It is anticipated that participants will improve their health behaviors and reduce health and safety hazards. In the long term, this model will reduce injuries, illnesses and related costs.

Ten farms in Nebraska are participating in this study. An occupational nurse with a farming background has been trained to perform the farm visits. The nurse performs both the health and farm safety assessments. Using a customizable iPad application (BioCheck™) the health screening data are safely stored and can be readily accessed by the clinic physician. Working in collaboration with a business consultant and the AgriSafe Network, a business model is being developed that will guide future studies and assure long term sustainability. This model will provide a financial platform to identify insurance and industry business partners.

Emergent, Re-emergent, and Persistent Issues in Agricultural Safety and Health in Nebraska and the CS-CASH Region

Murray Madsen PI

Current press clips related to agricultural injuries and fatalities are analyzed, coded, and entered into an accessible dataset that is distributed each month. These reports facilitate discovery of issues, including the newly-emergent ones, and encourage dialogue and information exchange. Quarterly summaries are prepared to help track the evolving, persistent experience of producers and to highlight targets for continuing prevention-intervention work. In CY2013, press clips captured 86 fatal (versus 92 in 2012) and 92 non-fatal events (versus 102 in 2012); 73% of fatal and 68% of nonfatal events involved mobile machinery. Overturns and run-overs were almost half of the mobile machinery deaths; collisions between farm equipment and motor vehicles top the non-fatal injuries at 30% of the nonfatal injury events involving in the "Tractors and Mobile Machinery" category. These data were used to create media messages that were disseminated to newspapers and used in email blasts to 14,000 farmers and ranchers in the CS-CASH 7-states region. Sample testing is underway to evaluate hyperlinks from database records to source clippings on the internet to further attract and assist researchers. Work is underway analyzing relationships between nonfatal injury events in press clippings and injuries reported in survey work by CS-CASH with USDA NASS." These data were shared throughout the year with researchers, agricultural reporters and others who required statistics on injury and fatality rates in the Central States region.

Grain Dust Exposure in the Allergic Lung

Jane Schuh PI

Agricultural workers and farming communities are repeatedly exposed to grain dust during harvest, transport, and storage. The objectives of this study are to investigate the impact of repeated grain dust inhalation on normal lungs and to compare/contrast that with the effect on allergic lungs. Our intent is to characterize the occupational risk of dust inhalation to an individual who is sensitized to fungus in order that evidence-based decisions on personal protection can be implemented. Dust samples were collected from the rafters of commercial grain elevators dealing in each commodity. We reported earlier that there were few bacterial organisms that could be cultured from either dust sample, and all of these were Gram-positive, spore-forming rods. Three fungal species were identified in the corn dust sample—*Acremonium*, *Aspergillus*, and *Penicillium*. While only 2 fungal species were identified in the soy bean dust sample—*Aspergillus* and *Penicillium*. Using an inhalation model of fungus-induced asthma that was developed in our laboratory, we used mice that had been sensitized to and challenged with *Aspergillus fumigatus* fungus to examine the effect of repeated exposure to corn or soybean dust. Naïve mouse lung showed a robust, short-lived neutrophilia within hours of dust inhalation. Removal of viable bacterial organisms by irradiation of the dust did not alter airway hyperresponsiveness, airway inflammation, or airway wall remodeling when compared to non-sterile dust exposure. Further, the additional fungi in the dust samples did not appreciably impact these parameters, as compared to animals that did not receive a dust treatment. Interestingly, when compared to allergic animals that did not receive dust exposure, both IgA and IgE were significantly decreased in the blood of allergic animals after exposure to sterilized soybean dust. We do not have a mechanism of action for this result, but speculate that it may be due to anti-inflammatory properties of the soybean itself. Although caution should be taken in extrapolating these data to a broader context, our work shows no deleterious link between fungal allergic asthma and increased morbidity after inhalation of grain dust from corn or soybean.

Pre-Professional Perceptions of Safety and Quality Concerns in Agricultural Work Environments

Gretchen Mosher PI

A strong positive correlation between low agricultural quality and occupational safety risk has been documented, yet college students may not be aware the two concepts are associated. While college students have some agricultural safety knowledge from both classroom and life experiences, agricultural undergraduates generally have little exposure to the principles of quality management.

A stratified random sample of approximately 4000 undergraduate students in Iowa State University's College of Agriculture and Life Sciences were surveyed regarding connections between safety and quality in the field of agriculture. The survey instrument was drawn from previous instruments and was pre-tested with graduating seniors. Variables to be analyzed using descriptive, regression and significance testing include: year in school; farm versus non farm experience; exposure/awareness of quality and safety; and academic discipline (15 small groups, 3 large). The controls are occupational safety students in Ag and Biosystems Engineering. Results will provide baseline data for further work on the interaction between quality management and occupational safety in agriculture, as well as provide guidance on the development of an agricultural-specific instrument to measure quality climate.



"When nurses can identify hazards in agricultural settings that impact health and injuries, that will serve them very well in their careers in rural practice."

Kearney NE Nursing Instructor

A \$40,000 award in FY02 from the UNMC Vice Chancellor of Research provided funding for 4 additional pilot projects.



Breakthroughs in understanding the types of bacteria that infect the lungs of farmers and ranchers after exposure to agricultural dust may lead to better treatments and outcomes.



A survey of 200 migrant farmworkers found high levels of stress and depression. Social isolation, exposure to harsh work environments, lack of formal education and inadequate health care contribute to these findings.

Certified Safe Farm Pilot Program **Dennis Holtz PI**

The Nebraska Safety Center in Kearney Nebraska is partnering on an AgHealth Nebraska farm safety assessment project with CS-CASH and Kearney's UNMC College of Nursing. The assessments and health screenings take place in the Kearney-area on farms that were randomly selected. The health screenings are conducted by first-year nurses in training from the UNMC College of Nursing program in Kearney using a mobile lab brought to the farm sites. Farmers, their families and employees are screened on site for blood pressure, glucose, hearing loss, skin cancer and other health issues. This screening allows study participants to identify potential health issues, set personal wellness goals and provides help in managing their healthcare. In addition to health screenings, Nebraska Safety Center personnel conduct safety assessments that include identifying, removing or fixing injury hazards on farm properties.

In addition to training healthcare professionals and improving health outcomes this project aims to implement the Certified Safe Farm program and partner with insurance companies and other organizations so that agricultural workers are acknowledged for having effective farm safety awareness programs in place. It is anticipated that compliance leads to a better safety record and can give farmers a break in insurance costs.

Chronic Bacterial Colonization, Agricultural Exposure and COPD **Tricia LeVan PI**

Chronic obstructive pulmonary disease (COPD) is the third leading cause of death and a major cause of morbidity among persons greater than 45 years of age. Farming has been associated with COPD. Among farmers, it has recently been estimated that the prevalence of COPD is 30% in smokers and as much as 17% in never smokers. COPD is an inflammatory disorder, which persists despite elimination of exposure. Understanding the cause of COPD inflammation, the COPD microbiome and its alteration of lung defense, is critical for implementation of antimicrobial interventions that may slow disease progression.

This study provides an opportunity to examine the airway microbial structure and function. The central hypothesis is that the indigenous airway microbiome changes with airway obstruction and agricultural exposure. The cohort will ultimately consist of 20 COPD patients with or without agricultural dust exposure. Induced sputum samples have been collected. These samples have been analyzed by 454 pyrosequencing, the data have been downloaded and the initial analysis phase of the mega-dataset has begun. To facilitate successful collection of induced sputum and complete the dataset for the remaining cohort, a high-pressure nebulizer is being purchased. A VA Merit application will be submitted March, 2014 and this proposal will utilize preliminary data generated from the CS-CASH program.

Stress and Mental Health Among Latino Farmworkers **Athena Ramos PI**

The purpose of the Migrant Farmworker Health Survey is to develop baseline information on the health of Latino migrant farmworkers in Nebraska and to understand the migratory pattern of Latino migrant farmworkers. Migrant farmworkers are an extremely vulnerable population as they are constantly on the move, exposed to harsh weather conditions, socially isolated due to language and location, economically disadvantaged, lack formal education, and lack a consistent source of healthcare. There is not any recent information regarding the migrant farmworker experience in Nebraska. The research team collected information from 200 participants across five central Nebraska counties over the summer of 2013. The team found high levels of stress and depression. In fact, 30.5% had high levels of stress and 45.8% were depressed. Creating more welcoming communities and enhancing health outreach services for workers may help in combatting feelings of social isolation and depression. Addressing mental health issues is a significant factor for worker health and safety as well as the well-being of rural, agricultural communities in Nebraska.

Development of a Multi-State Capacity to Disseminate and Evaluate the Efficacy of a Web-Based Stress management Program for Agricultural Producers

Katherine Slama and Patrick Hart PIs

Stress is a significant cause of mental health and medical problems in the agricultural population. However, these mental health needs are insufficiently met. This pilot project created a consortium from four states (IA, MN, SD and ND) to develop and submit a grant application to disseminate and evaluate a model, multi-state on-line Dealing with Stress (DWS) workshop series for agricultural producers.

Consortium participants took part in a grant planning symposium that provided input on the grant process. Following the symposium feedback was prepared and sent to the symposium attendees. Suggestions from participants on the DWS workshop included: minimizing the clinical language, respecting agricultural/rural cultural norms (the importance of confidentiality, independence, family and the land), addressing stress as professional development and life management. The importance of evaluating each segment of the workshop was addressed. The approach to creating the consortium was an invitational symposium conducted in a blended in-person and web-based mode. The symposium identified the four states' agricultural communication resources and stakeholder organizations appropriate to forming the consortium and following through with a 2014 HRSA grant proposal. Key elements of the 2-14 HRSA proposal will be to (a) develop outcome measures of the effectiveness of the DWS workshop and multi-state dissemination effort, and (b) identify agricultural and rural mental health databases that will support both the DWS evaluation and surveillance action steps of intermediate NORA Goal 5.5. "To promote rural health care services outreach by expanding health care delivery to include new or enhanced services in rural areas". Established partnerships and data from this project will be used to strengthen a 2014 HRSA grant application. The stated purpose of the grant is "To promote rural health care services outreach by expanding health care delivery to include new or enhanced services in rural areas".

Imminent Hazards in English and Spanish

Jason Stratman PI

This project is designed to close a growing communication gap between English-speaking and Spanish-speaking employees working at the same farm location. This gap is being addressed through practitioner research, which will lead to the development of bilingual hazard awareness pictograms that can be easily modified and used at farm operations. Specifically, the pictograms will be focused on imminent safety concerns related to farming operations.

Information regarding imminent hazards at farm sites was gathered from practitioners using surveys designed and distributed by Western Nebraska Community College (WNCC). Refinement of the initial information was conducted by an advisory committee consisting of farmers, ranchers, safety consultants, and educators familiar with hazards at farm sites. WNCC distributed 200 surveys to regional professionals in agriculture-related industries. Surveys asked participants to identify and rank, in order of severity, 20 of the most prevalent imminent hazards found at farm locations. The results were tabulated and presented to a committee to give insight at a face-to-face workshop session. The committee identified the top 15 agreed upon hazards which formed the basis for development of 10 bilingual hazard awareness pictograms. To date 4 pictograms have been completed with an anticipated completion date for the remaining pictograms of spring 2014.

Prevention and Treatment of Agricultural Respiratory Disorders: A Pilot Educational Program of Rural Health Care NPs and PAs

Kathy Morris PI

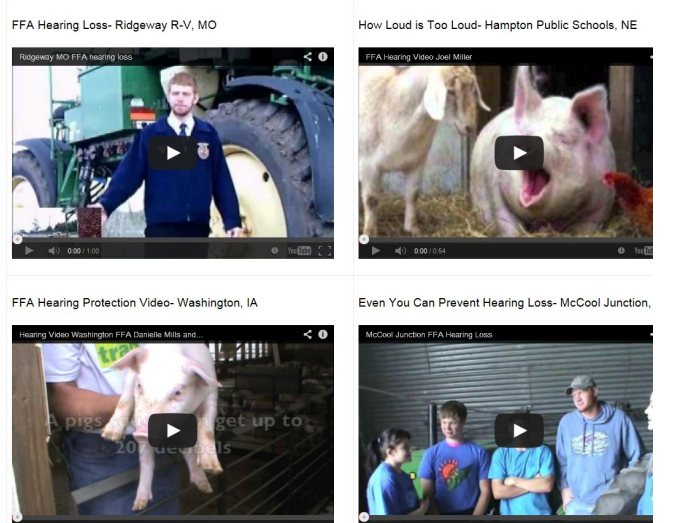
Agricultural workers are exposed to an ever expanding number of potentially harmful agents that can affect the respiratory system. The prevention and treatment of acute and chronic illness related to agricultural respiratory disorders, is a necessary component in caring for the rural agricultural worker. In Nebraska, Nurse Practitioners (NPs) and Physician Assistants (PAs) provide care in rural areas of the state, however many have not had any formal education regarding agricultural-related respiratory diseases. This study evaluates the knowledge level of NPs and PAs regarding evaluation, diagnosis and treatment of agricultural respiratory diseases and pilots an innovative, evidence-based, continuing education program utilizing problem-based learning strategies.

Results from a survey sent to 631 NPs and PAs in Nebraska indicated that 71% were uncomfortable or somewhat uncomfortable recognizing and treating agricultural related illnesses. While 75% of the participants indicated that they would be interested in continuing education on respiratory-related disorders in agricultural workers. The knowledge portion of the survey indicated a need for education in a number of respiratory health topics. Educational programs and seminars for NPs and PAs are currently underway. The objectives for each session are for participants to be able to describe 5 common agricultural respiratory hazards, identify 4 respiratory conditions associated with agricultural dust and gas exposure and to determine when personal respirators are appropriate for use in the prevention of acute and chronic agricultural respiratory disease.

CS-CASH Core and Program Activities FY02

FY02 CS-CASH Activity	States Involved	# of Events
Article (peer reviewed)	All States	12
Article/Report (non-peer reviewed)	All States	18
Booklet/Brochure/Factsheet	NE, UT	2
Course/Curriculum (short course or training)	IA,MN,NE, NC	2
Evaluation Instrument/Tool	7 Central States	2
Focus Group	NE	2
Interview (media/other)	All States	3
Material Distribution	All States	18
Meeting/Conference	All States	16
Newsletter	All States	3
On-site Safety Audit	NE, MO	9
Peer Review (grant/paper)	MN	3
Presentation (oral)	All States	32
Presentation (poster)	All States	15
Questionnaire/Survey/Checklist	7 Central States	23
Site Visit	IA, MN,NE	4
Testing/Screening (clinical)	7 Central States	3
Training/Demonstration	IA,NE	2
Video/Multimedia Material	All States	2
Workshop	7 Central States plus CA, CO, WA, CA, CO	3

WATCH THE WINNING VIDEOS



FFA students produced hearing loss prevention videos that were viewed and voted on over 2200 times. Evaluation showed increased knowledge in those involved in the video production.



Pictograms are being produced in English and Spanish depicting the 15 greatest safety and health hazards on farms and ranches. These teaching aids will be used on Ag operations in the CS-CASH region.

CS-CASH Peer-Reviewed Publications FY02 (9/1/12 — 8/31/13)

1. Nordgren, T. M., A. J. Heires, T. A. Wyatt, J. A. Poole, T. D. LeVan, D. R. Cerutis, and D. J. Romberger. Maresin-1 reduces the pro-inflammatory response of bronchial epithelial cells to organic dust. *Respiratory Research* 14:51-60, 2013.
2. Wyatt, T. A., S. M. Wells, Z. A. Alsaidi, J. M. DeVasure, E. B. Klein, K. L. Bailey, and J. H. Sisson. Asymmetric dimethylarginine blocks nitric oxide-mediated alcohol-stimulated cilia beating. *Mediators of Inflammation*, Volume 2013, Article ID 592892, <http://dx.doi.org/10.1155/2013/592892>, PMID: PMC3836567, 2013.
3. Golden, G. A., T. A. Wyatt, D. J. Romberger, D. Reiff, M. L. McCaskill, C. Bauer, A. M. Gleason, J. A. Poole. Vitamin D treatment modulates organic dust-induced cellular and airway inflammatory consequences. *J. Biochem. Mol. Toxicol.* 27(1):77-86, 2013.
4. Bauer, C., T. Kielian, T. A. Wyatt, W. W. West, A. M. Gleason, D. J. Romberger, and J. A. Poole. MyD88-dependent pathway is critical to acute organic dust-induced airway inflammation in mice. *Am. J. Respir. Mol. Cell Biol.* 48:781-789, 2013.
5. Bailey, K. L., T. A. Wyatt, S. M. Wells, E. Klein, J. E. Robinson, D. J. Romberger, and J. A. Poole. Dimethylarginine dimethylaminohydrolase (DDAH) overexpression attenuates agricultural organic dust induced inflammation. *J. Environ. Immunol. Tox.* 2013.
6. Burgus, S., C.V. Schwab, M. Shelly. Assessing Rural Coalitions That Address Safety and Health Issues. *Journal of Extension* 50(2).
7. J. C. Gillette, C. A. Stevermer, R. H. Miller, W. B. Edwards, and C. V. Schwab. Lower extremity joint moments during carrying tasks in Children. *Journal of Applied Biomechanics.* 28:156-164.
8. Karttunen JP, Rautiainen RH. Distribution and characteristics of occupational injuries and diseases among farmers: retrospective analysis of workers' compensation claims. *Am J Ind Med*
9. Leppala J, Kauranen I, Rautiainen RH. Effectiveness of occupational health service programmes in farmers' safety and security risk management. *International Journal of Agricultural Management.* May 2013 2(3): 130-140
10. Jawa R, Young D, Shostrom VK, Stothert JS, Cemaj S, Rautiainen R. Farm machinery injuries; the 15-year experience at an urban joint trauma center system in a rural state. *Journal of Agromedicine* March 2013 18(2) 98-106
11. Onwuameze OE, Paradiso S, Peek-Asa C, Donham KJ, Rautiainen RH. Modifiable risk factors for depressed mood among farmers. *Ann Clin Psychiatry* 2013 May; 25(2): 83-90
12. Karttunen, J.P., Rautiainen, R.H. Distribution and Characteristics of Occupational Injuries and Diseases among Farmers: a Retrospective Analysis of Workers' Compensation Claims. *Am J Ind Med.* 2013

CS-CASH Non Peer-Reviewed Publications FY02 (9/1/12 — 8/31/13)

1. *FFA Students Produce Hearing Safety Video.* Aurora News Register, Aurora NE. (Circulation 800) Ellen Duysen
2. *Planting delays heighten safety concerns this spring.* Iowa Farm Bureau Report, Central Iowa (Circulation 1200) Charles Schwab
3. *CS-CASH hopes to make farming and ranching safer.* Nebraska Farmer, Nebraska (Circulation 12,000) Risto Rautiainen and Don McCabe
4. *Chemicals: the good, the bad, and the deadly.* Country Folks, A Lee Publication. (Circulation 1000) Charles Schwab
5. *Farming is the most dangerous industry.* Quad City News. (Circulation 1000) Charles Schwab
6. *Farm Safety Center takes aim at most dangerous job.* Lebanon Daily Record. (Circulation 5000) Risto Rautiainen
7. *Nebraska Safety Initiative Head Wants to Cut Farm Accidents.* Claims Journal (Circulation 20,000) Risto Rautiainen
8. *Farm Safety Center takes aim at most dangerous job.* TriState Neighbors Newspaper, Sioux Falls SD (Circulation 28,000) Risto Rautiainen
9. *Initiative seeks more progress on farm safety.* Omaha World Herald (Circulation 160,000) Risto Rautiainen
10. *Safety initiative head wants to cut farm accidents.* Hutch News, Hutchinson KS (Circulation 27,650) Risto Rautiainen
11. *Safety initiative head wants to cut farm accidents.* The Atlantic Journal Constitution. (Circulation 231,000) Risto Rautiainen
12. *Farm Safety Center takes aim at most dangerous job.* Lincoln Journal Star. Lincoln NE (Circulation 76,374) Risto Rautiainen
13. *Save Your Breath.* Successful Farming Magazine (Circulation 420,000) Cheryl Tevis, Ellen Duysen, Deb Romberger, Lea Pounds
14. *Researchers study grain dust impact on health.* 2012 Annual Highlights for the ND Agricultural Experiment Station and NDSU Extension Service (Circulation 400) Jane Schuh
15. *Can You Win a Tug-of-War with Grain?* Monsanto Promotional Material (Circulation 500) Charles Schwab
16. *2012 Iowa Harvest Exposure to mold and Dust in Grain.* Integrated Crop Management News (Circulation 1000) Charles Schwab
17. *Drought conditions heighten harvest safety concerns.* Iowa Farm Bureau Newsletter (Circulation 2000) Charles Schwab
18. *Handle your grain harvest with care.* SafeFARM Alberta News. (Circulation 1000) Charles Schwab